

Claims

What is claimed is:

- [c1] A method for processing seismic data to detect anomalously absorptive zones, comprising:
 - joint time-frequency decomposing seismic traces;
 - low frequency bandpass filtering the decomposed traces to determine a general trend of mean frequency and bandwidth of the seismic traces; and
 - high frequency bandpass filtering the decomposed traces to determine local variations in the mean frequency and bandwidth of the seismic traces, whereby anomalous zones are determined when the local variations deviate from the general trend.
- [c2] The method of claim 1 wherein the decomposing comprises Gabor-Morlet decomposition.
- [c3] The method of claim 1 wherein the low frequency bandpass filtering comprises averaging over a time window of about 800 milliseconds duration.
- [c4] The method of claim 1 wherein the high frequency bandpass filtering comprise averaging over a time window having a duration about equal to a seismic wavelet time.
- [c5] The method of claim 1 further comprising spectrally balancing the decomposed traces and inversion processing the spectrally balanced decomposed seismic traces to determine relative acoustic impedances.
- [c6] The method of claim 5 further comprising determining hybrid attributes of the seismic traces from the low and high frequency bandpass filtered traces and the relative acoustic impedances.
- [c7] The method of claim 6 wherein the hybrid attributes comprise:
 - anomalously high absorption/low acoustic impedance zones;
 - anomalously high absorption/high acoustic impedance zones;

anomalously low absorption/low acoustic impedance zones;
and anomalously low absorption/low acoustic impedance zones.

- [c8] The method of claim 1 wherein at least one of the low frequency and high frequency bandpass filtering is weighted with respect to an envelope of the seismic traces.
- [c9] The method of claim 1 wherein an anomalously high absorbing zone is identified when the local variation indicates bandwidth and RMS frequency lower than the bandwidth and the RMS frequency of the general trend.
- [c10] The method of claim 1 further comprising averaging a selected number of decomposed traces prior to low pass filtering to determine the general trend.
- [c11] A computer program stored in a computer readable medium, the program including logic operable to cause a programmable computer to perform steps comprising:
 - joint time-frequency decomposing seismic traces;
 - low frequency bandpass filtering the decomposed traces to determine a general trend of mean frequency and bandwidth of the seismic traces; and
 - high frequency bandpass filtering the decomposed traces to determine local variations in the mean frequency and bandwidth of the seismic traces, whereby anomalously absorptive zones are determined when the local variations deviate from the general trend.
- [c12] The program of claim 10 wherein the decomposing comprises Gabor-Morlet decomposition.
- [c13] The program of claim 10 wherein the low frequency bandpass filtering comprises averaging over a time window of about 800 milliseconds duration.
- [c14] The program of claim 10 wherein the high frequency bandpass filtering comprise averaging over a time window having a duration about equal to a seismic wavelet time.
- [c15] The program of claim 10 further comprising logic operable to cause the computer to perform spectrally balancing the decomposed traces and inversion processing the

spectrally balanced decomposed seismic traces to determine relative acoustic impedances.

- [c16]** The program of claim 15 further comprising logic operable to cause the computer to perform determining hybrid attributes of the seismic traces from the low and high frequency bandpass filtered traces and the relative acoustic impedances.
- [c17]** The program of claim 16 wherein the hybrid attributes comprise:
 - anomalously high absorption/low acoustic impedance zones;
 - anomalously high absorption/high acoustic impedance zones;
 - anomalously low absorption/low acoustic impedance zones;
 - and anomalously low absorption/low acoustic impedance zones.
- [c18]** The program of claim 10 wherein at least one of the low frequency and high frequency bandpass filtering is weighted with respect to an envelope of the seismic traces.
- [c19]** The program of claim 10 wherein an anomalously high absorbing zone is identified when the local variation indicates bandwidth and RMS frequency lower than the bandwidth and the RMS frequency of the trend.
- [c20]** The program of claim 1 further comprising logic operable to cause the computer to perform averaging a selected number of decomposed traces prior to low pass filtering to determine the general trend.